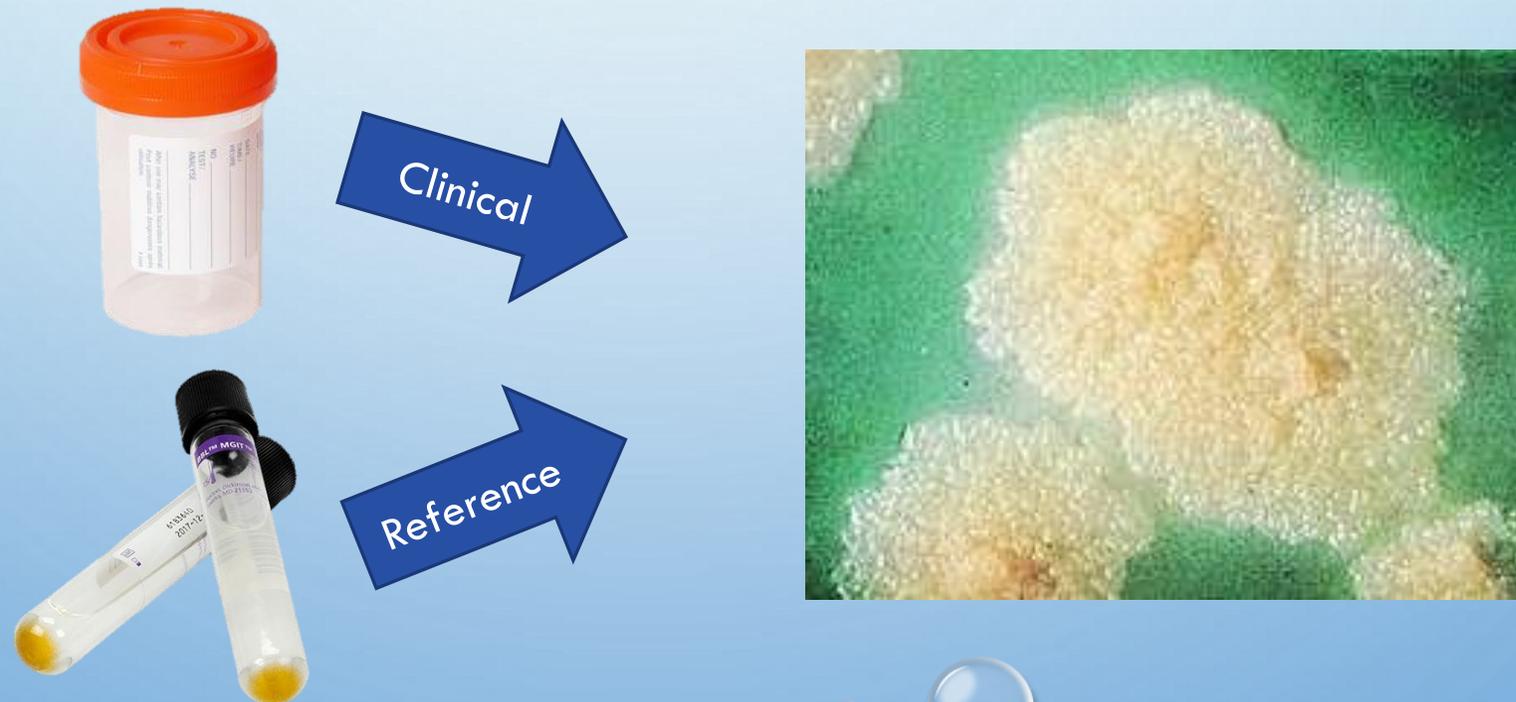
The background is a light blue gradient with several realistic water droplets of various sizes scattered across the surface. The droplets have highlights and shadows, giving them a three-dimensional appearance.

DCLS TB LABORATORY

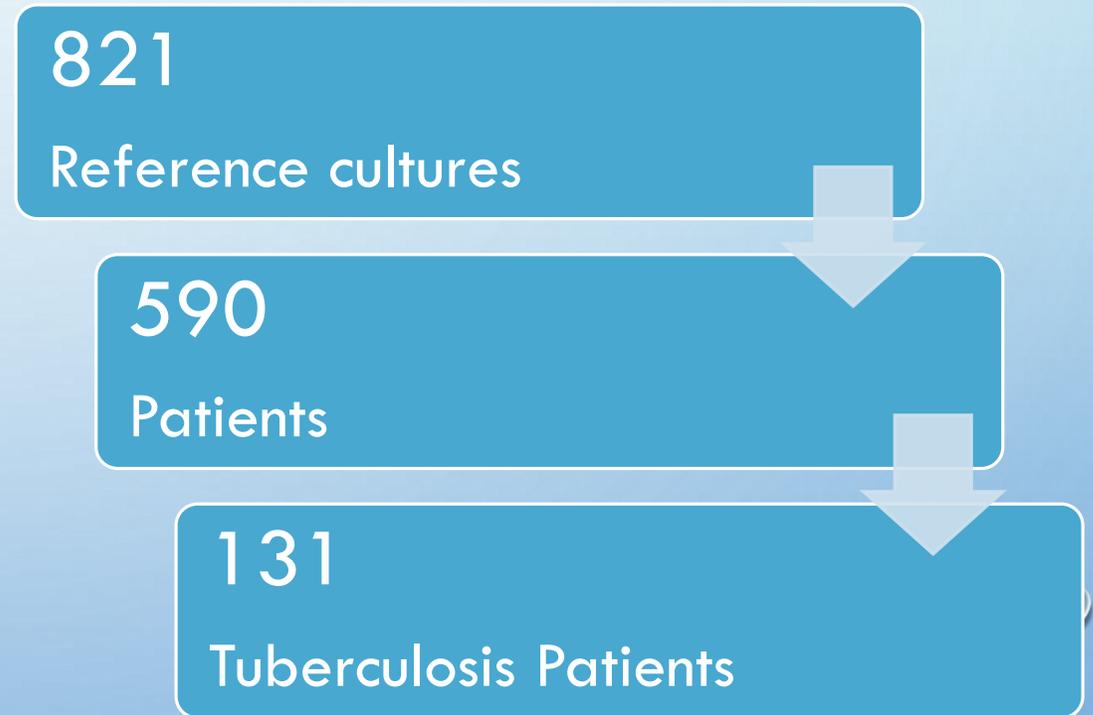
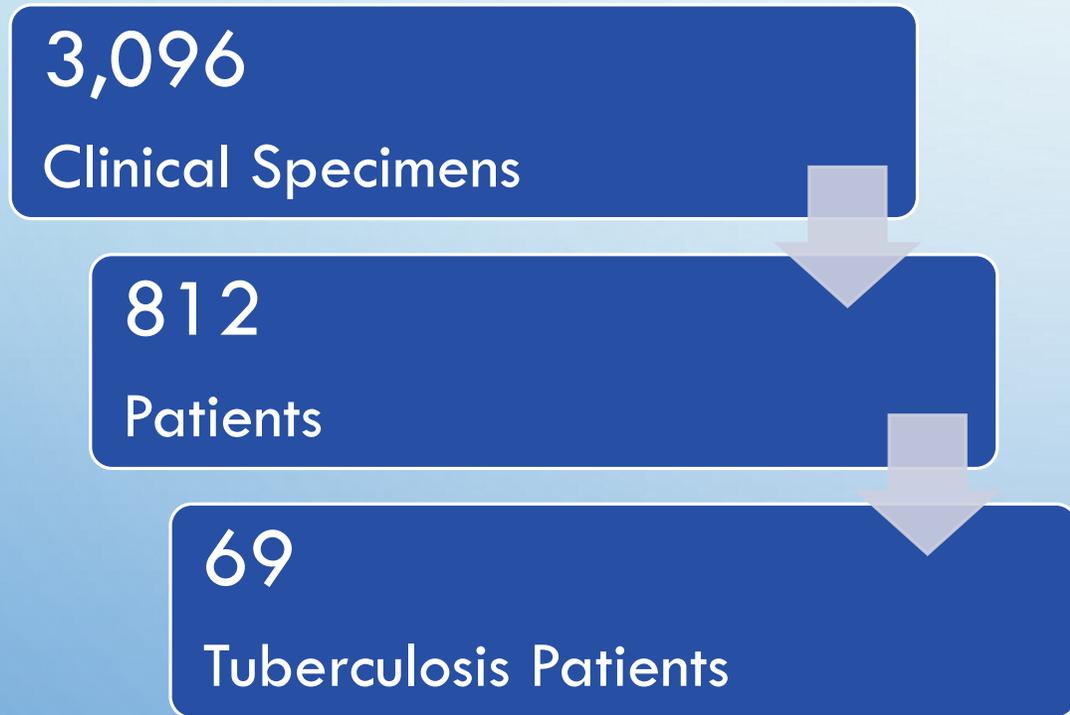
TESTING AND RESULTS

BACKGROUND

- TB LABORATORY PROVIDES TESTING SERVICES FOR THE DETECTION AND IDENTIFICATION OF MYCOBACTERIA



THE NUMBERS



CLINICAL TESTING OVERVIEW

Decontamination & Concentration

Fluorochrome

GeneXpert



Culture and Identification

Liquid Media

Solid Media



TB Susceptibility

First line

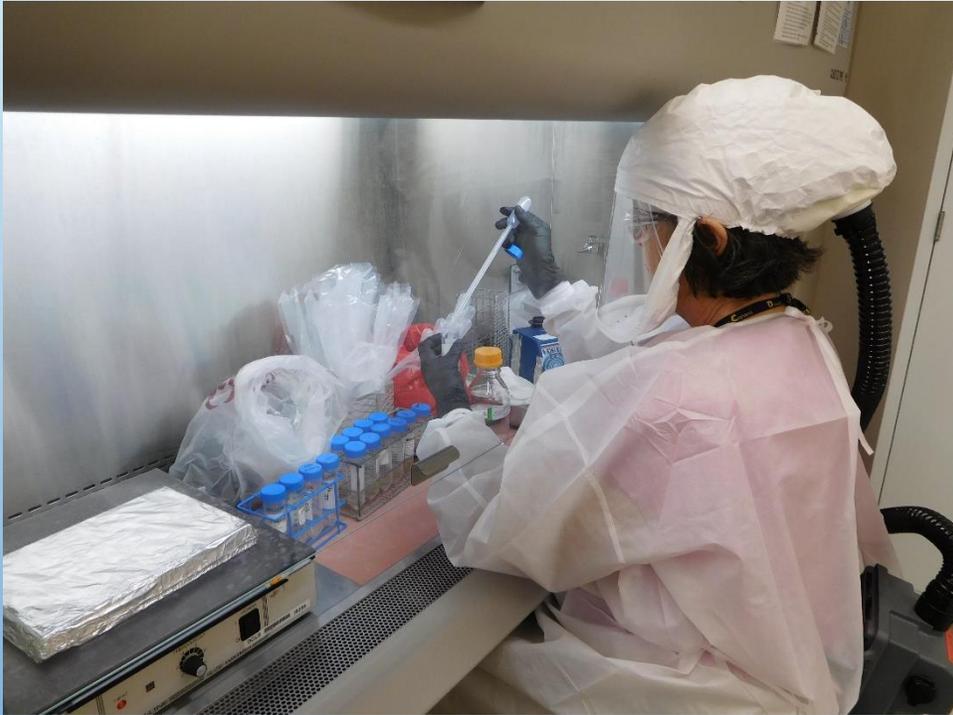
Second line

SPECIMEN PROCESSING

Decontamination & Concentration



SPECIMEN PROCESSING



1. NALC-NAOH ADDED TO SPUTUM
2. VORTEX
3. LET STAND 15 MINUTES

THE NALC HELPS TO DIGEST AND LIQUEFY THE SPUTUM IN ORDER TO INCREASE THE CONTACT WITH THE NAOH THAT DECONTAMINATES THE SPUTUM.

SPECIMEN PROCESSING



4. M15 BUFFER ADDED TO SPUTUM
5. MIX

THE BUFFER NEUTRALIZES THE SPUTUM IN ORDER TO ALLOW THE MYCOBACTERIA TO SURVIVE.

SPECIMEN PROCESSING



6. TUBES ARE CENTRIFUGED FOR 15 MINUTES AT 3,000 X G AT 10°C.

CENTRIFUGATION CONCENTRATES THE SPUTUM AND MYCOBACTERIA TO A PELLET AT THE BOTTOM OF THE TUBE

SPECIMEN PROCESSING



7. SUPERNATANT IS Poured OFF
8. PELLET IS RE-SUSPENDED IN 2 ML OF BUFFER

SPECIMEN PROCESSING



9. RE-SUSPENDED PELLET IS INOCULATED TO A BROTH, SOLID SLANT, AND A SMEAR IS MADE

MEDIA WILL BE INCUBATED TO GROW THE ORGANISM AND SMEAR WILL BE STAINED THAT DAY.

Decontamination & Concentration

Fluorochrome

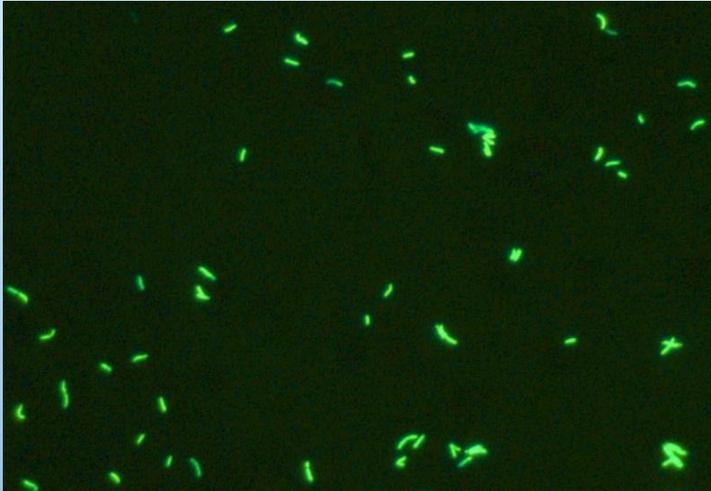


FLUOROCHROME SMEAR



- SPUTUM SEDIMENT IS APPLIED TO SLIDE
- HEAT FIXED AND STAINED WITH AUROMINE-O FLUORESCENT STAIN
- 30 FIELDS ARE READ AT LOW MAGNIFICATION
- ACID FAST BACILLI STAIN GREEN-YELLOW
- NUMBER OF BACTERIA ARE QUANTIFIED

LIMITATIONS



- NOT SPECIFIC FOR MYCOBACTERIA
- CANNOT DETERMINE SPECIES OF MYCOBACTERIA
- LESS SENSITIVE THAN CULTURE
- NEGATIVE RESULT DOES NOT RULE OUT MYCOBACTERIAL INFECTION

REPORTING

WHEN NO AFB ARE OBSERVED:

“NEGATIVE - NO ACID-FAST BACILLI SEEN”

WHEN AFB OBSERVED:

“POSITIVE – [QUANTITATION 1+, 2+, 3+, 4+]”

- POSITIVE SMEAR REPORTED BY PHONE SAME DAY SAMPLE RECEIVED
- FLUOROCHROME SMEAR IS AN INDICATION OF INFECTIOUSNESS OF PATIENT AND CAN BE USED TO MONITOR TREATMENT

PRELIMINARY REPORT

Microscopy Report	Date Released : 5/27/16 13:56		
Fluorochrome : POSITIVE 3+ 10-90 acid fast bacilli per field			
Results phoned to			
ContactName	Date	Called by	Comments
LOUDOUN COUNTY H D - RESEARCH PLACE	05/27/2016	Savannah McReynold	GAVE SMEAR RESULT TO SARAH WASHINGTON

Decontamination & Concentration

Fluorochrome

GeneXpert



FIRST TIME SMEAR POSITIVE → GENEXPERT TESTING

- NUCLEIC ACID AMPLIFICATION TEST NAAT
- DETECTION OF THE TARGET SEQUENCE IN BACTERIAL DNA

M. tuberculosis
and
Rifampin resistance



GENEXPERT CRITERIA

- EXPECTORATED OR INDUCED SPUTUM
- TESTING PERFORMED ON THE PROCESSED SPUTUM SEDIMENT
 - SMEAR POSITIVE

- POTENTIAL FOR FALSE NEGATIVE RESULTS WHEN PATIENT HAS BEEN ON TB DRUGS FOR >3 DAYS
- NOT APPROVED FOR USE ON PEDIATRIC PATIENTS
- DECREASED SENSITIVITY FOR SMEAR NEGATIVE SPECIMENS

SPECIMENS WILL BE RUN ONLY UPON REQUEST OF VDH TB CONTROL AND REPORTED WITH A DISCLAIMER

NAAT

ADVANTAGES

- RAPID
- TEST DIRECT CLINICAL SPECIMEN
- INCREASED SENSITIVITY OVER AFB STAIN

DISADVANTAGES

- DETECTS NON-VIABLE ORGANISM
- SPECIMEN MAY CONTAIN INHIBITORS
- NEGATIVE TEST DOES NOT EXCLUDE THE POSSIBILITY OF ISOLATING MTBC IN CULTURE

RESULTS

- MTB DETECTED
 - RIFAMPIN RESISTANCE DETECTED
 - RIFAMPIN RESISTANCE NOT DETECTED
- MTB NOT DETECTED

PRELIMINARY REPORT

GENEXpert

Date Released : 5/31/16 16:22

Mycobacterium tuberculosis complex DNA detected by direct specimen Nucleic Acid Amplification Test.

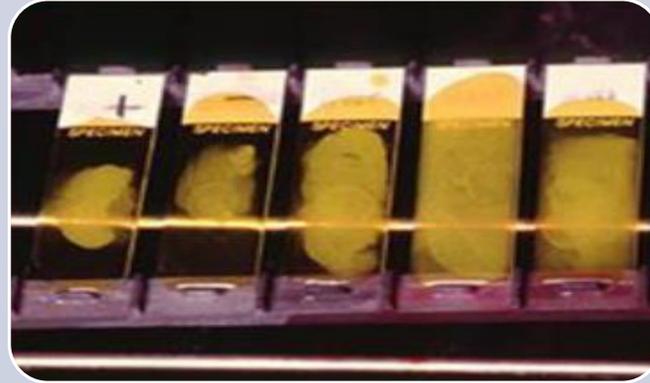
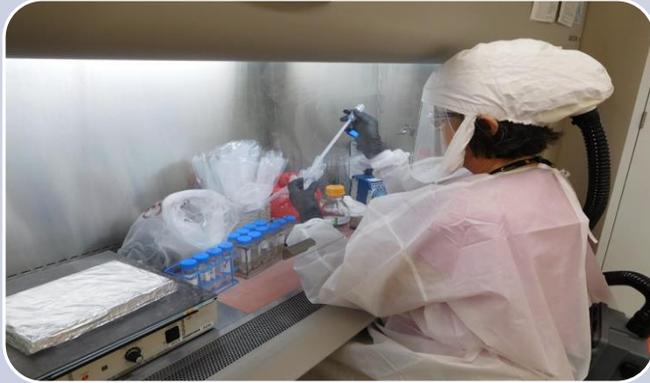
No rpoB gene mutations detected by direct specimen Nucleic Acid Amplification Test, probably Rifampin susceptible. Conventional drug susceptibility testing will follow.

Comment: Results from the MTB/RIF test should be interpreted in conjunction with other laboratory and clinical data. If test results do not match clinical signs and symptoms, additional testing may be warranted. A result of "Mycobacterium tuberculosis complex DNA Not Detected" does not exclude the possibility of isolating a Mycobacterium tuberculosis complex organism from the specimen. Additionally, a result of "No rpoB gene mutations detected; probably Rifampin susceptible" does not exclude the possibility of Rifampin resistance. Test results may be affected by inhibitors and variability in specimen collection and transport.

Results phoned to

ContactName	Date	Called by	Comments
LOUDOUN COUNTY H D - RESEARCH PLACE	05/31/2016	Randy Oglesby	LEFT MESSAGE FOR ERLIN TO CALL FOR GENEXPERT RESULT
LOUDOUN COUNTY H D - RESEARCH PLACE	06/01/2016	Randy Oglesby	GAVE GENEXPERT RESULT TO SARAH W

TESTING SCHEDULE



M-F

M-F

(Resulted within
24h of receipt)

M,W,F

(Resulted within
72h of receipt)

Decontamination & Concentration

Fluorochrome

GeneXpert



Culture and Identification

Liquid Media

Solid Media



CULTURE



Solid Media

LJ



Liquid Media

MGIT



Culture incubates up to
42 days

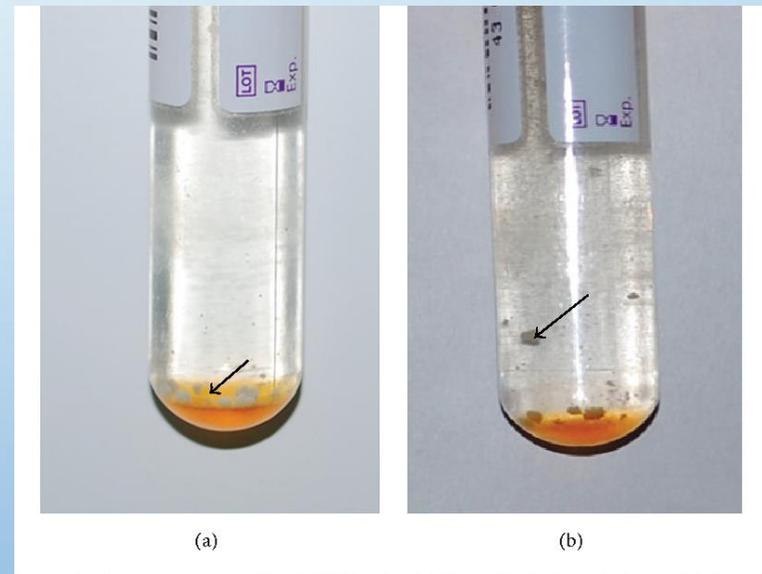


CULTURE

SOLID MEDIA

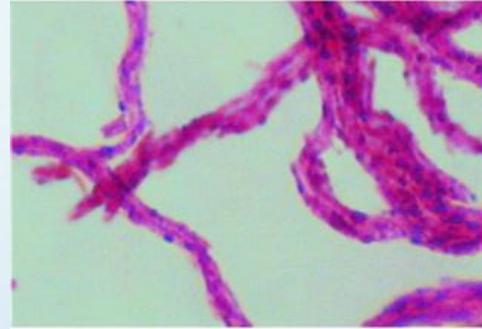


MGIT BROTH

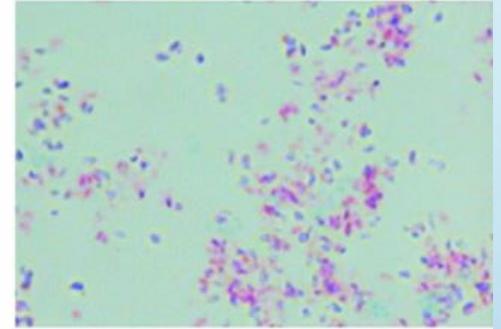


CULTURE GROWTH → KINYOUN STAIN

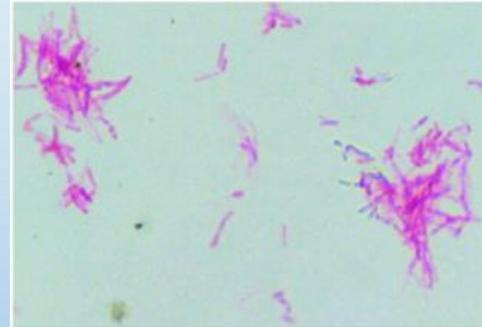
a) cording



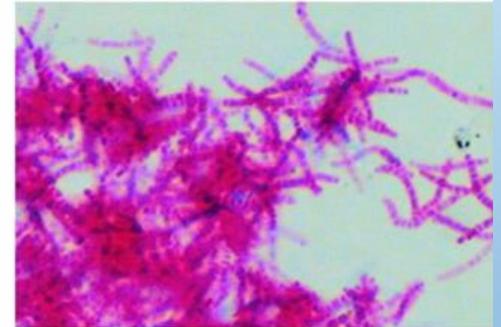
b) dot



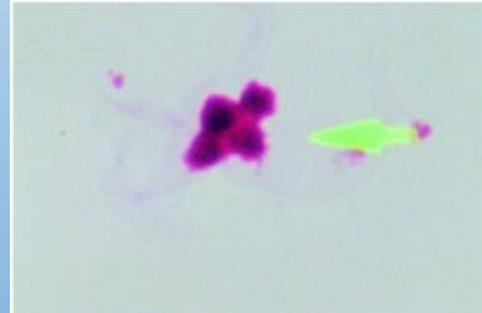
c) needle



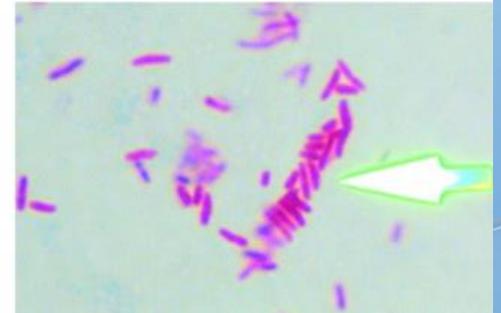
d) ladder



e) ball



f) short



RESULTS

- AFB GROWTH IN CULTURE

Preliminary Report

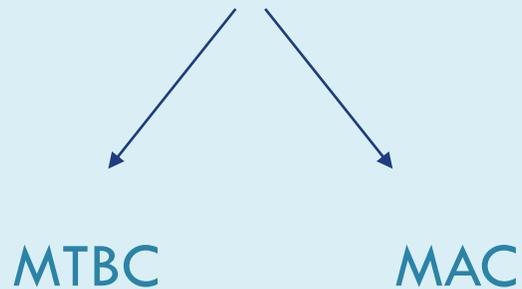
Date Released: 08/06/2018

Acid-fast bacilli observed, identification to follow

CULTURE - IDENTIFICATION

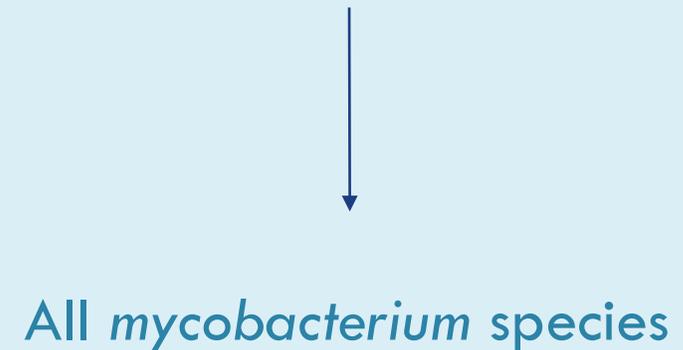
DNA Probe

Test uses complimentary DNA to detect specific species of Mycobacteria



16S DNA Sequencing

Test amplifies and sequences the bacterial gene



CULTURE RESULTS

+ DNA Probe

Mycobacterial DNA Probe

Date Released: 07/06/2018

M.tb complex probe : Positive
Drug susceptibility testing to follow.

Mycobacterium tuberculosis complex includes Mycobacterium tuberculosis, Mycobacterium bovis, and Mycobacterium africanum, all of which cause the clinical syndrome, tuberculosis . All laboratory results should be interpreted in conjunction with clinical findings .

Results phoned to

Contact Name

TAZEWELL COUNTY HEALTH
DEPARTMENT

Date

07/03/2018

Called by

Barbara Gardner

Comments

CALLED PROBE RESULTS TO
CHRISTINE, RN.

CULTURE RESULTS

16S DNA Sequencing

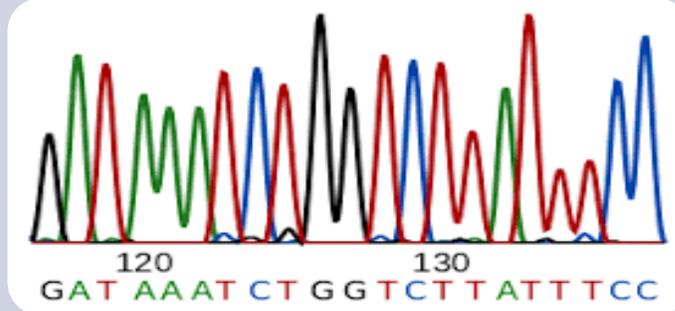
Final Conclusion

Date Released: 08/16/2018

1 - 10 colonies Mycobacterium fortuitum group identified by 16S rRNA gene sequence analysis and phenotypic characterization.

Disclaimer: This test has not been cleared or approved by the U.S. Food and Drug Administration. The results from this assay should not be used independently to make decisions regarding the management of patient care or public health.

TESTING SCHEDULE



T,TH

Batched
Weekly

Decontamination & Concentration

Fluorochrome

GeneXpert



Culture and Identification

Liquid Media

Solid Media



TB Susceptibility

First line

DRUG SUSCEPTIBILITY TESTING

- MGIT 960 METHOD
- RAPID (4-13 DAYS), QUALITATIVE PROCEDURE
- *M. tuberculosis*
- TEST IS BASED ON GROWTH OF THE ISOLATE IN A DRUG-CONTAINING TUBE COMPARED TO A DRUG-FREE TUBE



FIRST-LINE DST



- Streptomycin 1.0 $\mu\text{g}/\text{mL}$
- Isoniazid 0.1 $\mu\text{g}/\text{mL}$
- Rifampin 1.0 $\mu\text{g}/\text{mL}$
- Ethambutol 5.0 $\mu\text{g}/\text{mL}$
- Pyrazinamide 100 $\mu\text{g}/\text{mL}$

RESULTS - SENSITIVE

PRELIMINARY REPORT

Drug Susceptibility Report

1st Line DST

Date Released : 06/29/2016

Streptomycin 1.0 ug/mL : SENSITIVE	-----
Isoniazid 0.1 ug/mL : SENSITIVE	-----
Rifampin 1.0 ug/mL : SENSITIVE	-----
Ethambutol 5.0 ug/mL : SENSITIVE	-----
Pyrazinamide 100 ug/mL : SENSITIVE	-----

RESULTS - RESISTANT

- RESISTANT DRUG RESULTS ARE CONFIRMED

Drug Susceptibility Report

1st Line DST

Date Released : 07/19/2018

Streptomycin 1.0 ug/mL : PRESUMPTIVE
RESISTANT, Confirmation to Follow

Isoniazid 0.1 ug/mL : PRESUMPTIVE
RESISTANT, Confirmation to Follow

Rifampin 1.0 ug/mL : SENSITIVE

Ethambutol 5.0 ug/mL : SENSITIVE

Pyrazinamide 100 ug/mL : SENSITIVE

Drug Susceptibility Report

1st Line DST

Date Released : 07/19/2018

Streptomycin 1.0 ug/mL : RESISTANT

*PREVIOUS: Streptomycin 1.0 ug/mL : PRESUMPTIVE RESISTANT,
Confirmation to Follow*

Amended: 07/30/2018

Isoniazid 0.1 ug/mL : RESISTANT

*PREVIOUS: Isoniazid 0.1 ug/mL : PRESUMPTIVE RESISTANT,
Confirmation to Follow*

Amended: 07/30/2018

Rifampin 1.0 ug/mL : SENSITIVE

Ethambutol 5.0 ug/mL : SENSITIVE

Pyrazinamide 100 ug/mL : SENSITIVE

CONFIRMATION RATE (2016)

SIRE AND 2ND LINES (EXCLUDING PZA)

95.4%

PZA

66.7%

Decontamination & Concentration

Fluorochrome

GeneXpert



Culture and Identification

Liquid Media

Solid Media



TB Susceptibility

First line

Second line

SECOND-LINE DST

Performed when first-line drug is resistant (except mono streptomycin)



- Capreomycin 3.0 $\mu\text{g}/\text{mL}$
- Ofloxacin 1.5 $\mu\text{g}/\text{mL}$
- Ethionamide 5.0 $\mu\text{g}/\text{mL}$
- Isoniazid 0.4 $\mu\text{g}/\text{mL}$

RESULTS

Drug Susceptibility Report

1st Line DST

Date Released : 07/19/2018

Streptomycin 1.0 ug/mL : RESISTANT

*PREVIOUS: Streptomycin 1.0 ug/mL : PRESUMPTIVE RESISTANT,
Confirmation to Follow*

Amended: 07/30/2018

Isoniazid 0.1 ug/mL : RESISTANT

*PREVIOUS: Isoniazid 0.1 ug/mL : PRESUMPTIVE RESISTANT,
Confirmation to Follow*

Amended: 07/30/2018

Rifampin 1.0 ug/mL : SENSITIVE

Ethambutol 5.0 ug/mL : SENSITIVE

Pyrazinamide 100 ug/mL : SENSITIVE

2nd Line DST

Date Released : 07/31/2018

Capreomycin 3.0 ug/mL : SENSITIVE

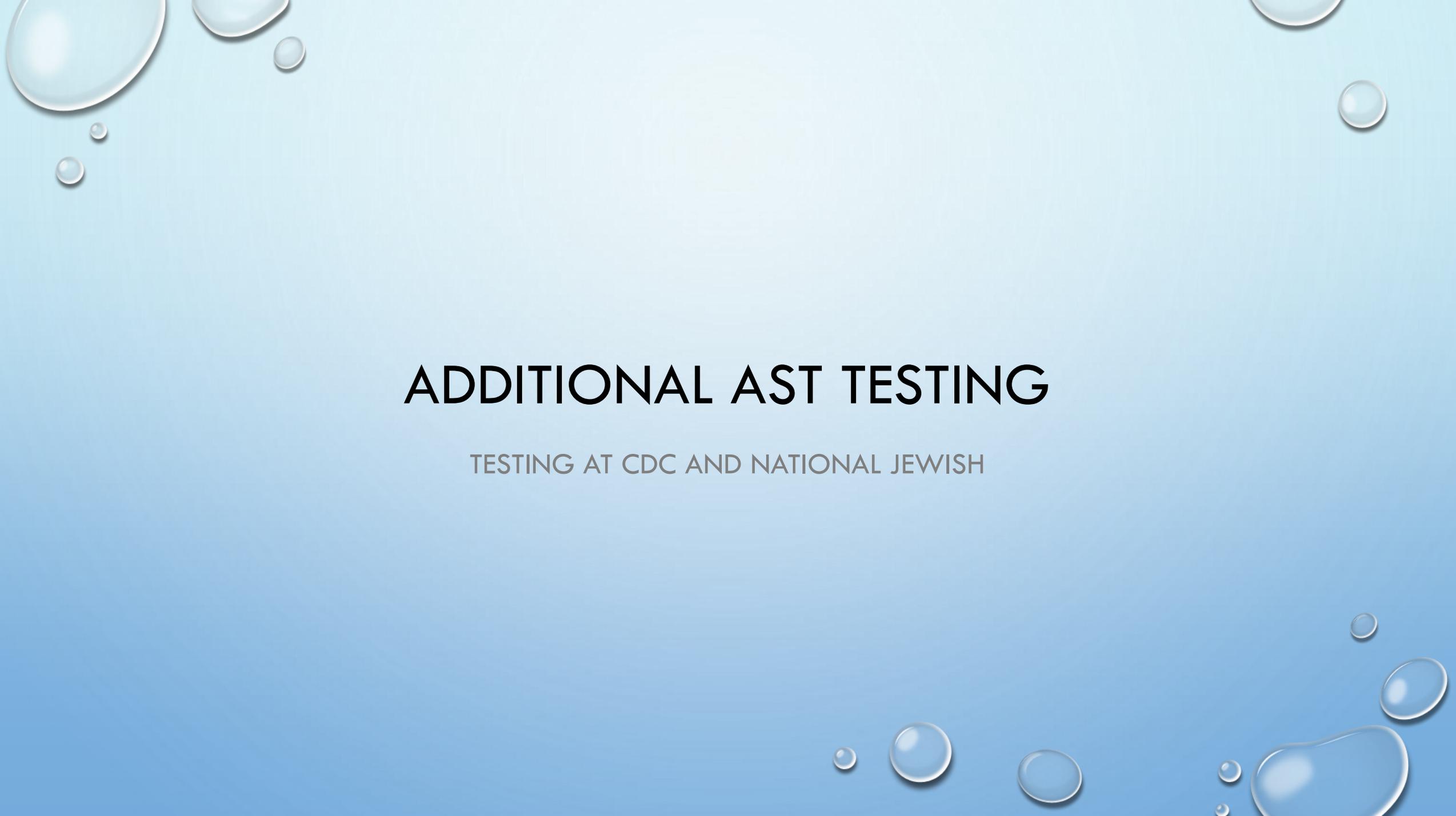
Ofloxacin 1.5 ug/mL : SENSITIVE

Ethionamide 5.0 ug/mL : SENSITIVE

Isoniazid 0.4 ug/mL : RESISTANT

*PREVIOUS: Isoniazid 0.4 ug/mL : Presumptive Resistant, Confirmation to
Follow*

Amended: 08/09/2018

The background is a light blue gradient with several realistic water droplets of various sizes scattered in the corners. The droplets have highlights and shadows, giving them a three-dimensional appearance.

ADDITIONAL AST TESTING

TESTING AT CDC AND NATIONAL JEWISH

CDC TESTING

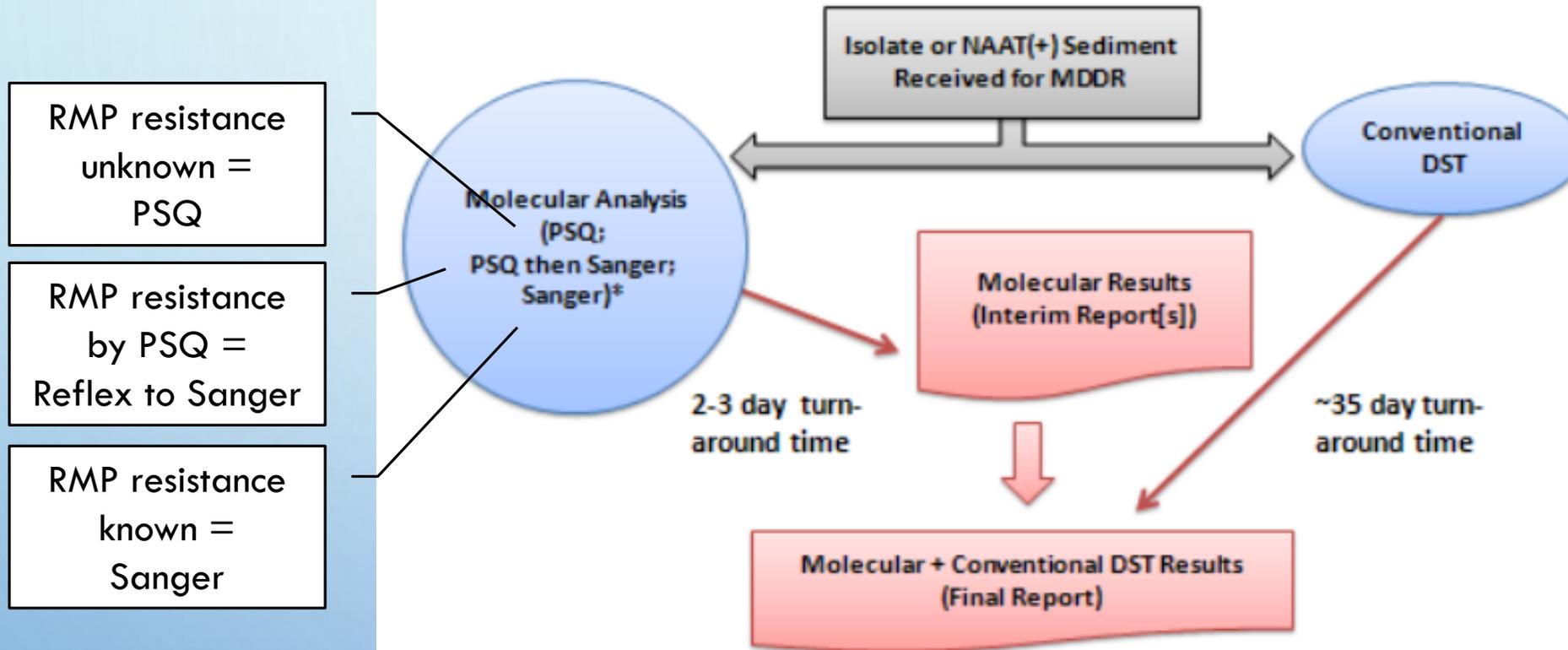
MDDR

- Utilizes sequencing for detection of mutations
 - Genetic testing
 - Rapid
 - Mixed or non-viable cultures
 - Sputum sediments or Isolates

Conventional DST

- Agar proportion method
 - Phenotypic testing
 - Slow
 - Pure
 - Isolates

MDDR V2.0 Algorithm



RMP resistance unknown = PSQ

RMP resistance by PSQ = Reflex to Sanger

RMP resistance known = Sanger

*based on information supplied on request form

MDDR RESULTS

Results for Molecular Detection of Drug Resistance (Sanger Sequencing, complete panel); Conventional Drug Susceptibility Test in progress.

Locus (region) examined*	Result	Interpretation (based on in-house evaluation of 550 clinical isolates)
rpoB (RRDR)	Mutation: TCG>TTG; Ser531Leu	Rifampin resistant. (100% of isolates in our in-house evaluation of 550 clinical isolates with this mutation are RMP-R.)
inhA (promoter)	No mutation	Isoniazid resistant. (100% of isolates in our in-house evaluation of 550 clinical isolates with this mutation are INH-R.)
katG (Ser315 codon)	Mutation: AGC>ACC; Ser315Thr	
embB (Met306, Gly406)	Silent mutation: CTG>CTA; Leu355Leu Neutral mutation: GAG>GCG; Glu378Ala	Cannot rule out ethambutol resistance. (79% of EMB-R isolates in our in-house evaluation of 550 clinical isolates have a mutation other than the ones detected at this locus.) The Leu355Leu mutation is a synonymous (silent) single-nucleotide polymorphism (SNP) and does not result in an amino acid change and is not considered clinically significant. The Glu378Ala mutation is likely a neutral mutation and is not associated with resistance.
pncA (promoter, coding region)	Mutation: GGT>GAT; Gly132Asp	Likely pyrazinamide resistant.
gyrA (QRDR)	No mutation	Cannot rule out fluoroquinolone resistance. (80% of FQ-R isolates in our in-house evaluation of 550 clinical isolates have a mutation at this locus.)
rns (1400 region)	No mutation	Cannot rule out resistance to injectable drugs (kanamycin, capreomycin, amikacin). (In our in-house evaluation of 550 clinical isolates: <ul style="list-style-type: none"> • 91% of AMK-R isolates have a mutation in the rns locus; • 87% of KAN-R isolates have a mutation in either the rns locus or the eis locus; • 55% of CAP-R isolates have a mutation in either the rns locus or the tlyA locus.)
eis (promoter)	No mutation	
tlyA (entire ORF)	No mutation	

*A negative result (e.g., no mutation) does not rule out contributory mutations present elsewhere in the genome.

CONVENTIONAL DST RESULTS

Susceptibility Testing Method: Indirect agar proportion, 7H10 medium; Susceptibility is defined as < 1% resistance compared to colonies that develop on drug-free media

RESULTS:

	Percent Resistance	Interpretation		Percent Resistance	Interpretation
Isoniazid 0.2 ug/ml	100%	R	Kanamycin 5.0 ug/ml	0%	S
Isoniazid 1.0 ug/ml	0%	S	Ethionamide 10.0 ug/ml	50%	R
Isoniazid 5.0 ug/ml	0%	S	Capreomycin 10.0 ug/ml	0%	S
Rifampin 1.0 ug/ml	0%	S	PAS 2.0 ug/ml	0%	S
Ethambutol 5.0 ug/ml	0%	S	Ofloxacin 2.0 ug/ml	0%	S
Streptomycin 2.0 ug/ml	50%	R	Amikacin 4.0 ug/ml	0%	S
Streptomycin 10.0 ug/ml	0%	S			
Rifabutin 2.0 ug/ml	0%	S			
Ciprofloxacin 2.0 ug/ml	0%	S			

Susceptibility Testing Method: MGIT 960

Pyrazinamide 100 ug/ml : Resistant

WHAT GETS SENT FOR MDDR?

- KNOWN RMP RESISTANCE
- PATIENT HISTORY (HIGH-RISK)
- PATIENT WHERE THE RESULT OF RESISTANCE WILL HAVE A HIGH PUBLIC HEALTH IMPACT
- PATIENT HAS KNOWN ADVERSE REACTIONS TO ANTI-TB DRUGS
- MIXED OR NON-VIABLE CULTURES

POSITIVE GENEXPERT
MTB +/-RIF RESISTANCE +

RESISTANT RIF
DST RESULT

REQUEST FROM TB
CONTROL

LAB WILL NOTIFY HD,
REQUEST FROM TB
CONTROL

All requests must be approved by CDC

WHAT GETS SENT FOR CONVENTIONAL DST?

- RESISTANT RESULT ON FIRST OR SECOND LINE DST PANEL PERFORMED BY DCLS
 - EXCEPT FOR MONO STREPTOMYCIN RESISTANCE
- RESISTANT RESULTS THAT DO NOT CONFIRM ON REPEAT TESTING

CDC ADDITIONAL RESOURCES

MDDR USERS GUIDE:

[HTTPS://WWW.CDC.GOV/TB/TOPIC/LABORATORY/MDDRUSERSGUIDE.PDF](https://www.cdc.gov/tb/topic/laboratory/mddrusersguide.pdf)

CDC REPORT OF EXPERT CONSULTATIONS ON RAPID MOLECULAR TESTING TO DETECT DRUG-RESISTANT TUBERCULOSIS IN THE UNITED STATES:

[HTTPS://WWW.CDC.GOV/TB/TOPIC/LABORATORY/RAPIDMOLECULARTESTING/DEFAULT.HTM](https://www.cdc.gov/tb/topic/laboratory/rapidmoleculartesting/default.htm)

SUSCEPTIBILITY TESTING OF BEDAQUILINE:

[HTTPS://WWW.CDC.GOV/TB/TOPIC/LABORATORY/CDC-PROTOCOL-FOR-DST-IN-BDQ-PATIENT-REQUEST.PDF](https://www.cdc.gov/tb/topic/laboratory/cdc-protocol-for-dst-in-bdq-patient-request.pdf)

NATIONAL JEWISH TESTING

- REQUEST FOR ADDITIONAL MIC SUSCEPTIBILITIES ON MTBC
 - CYCLOSERINE, MOXIFLOXACIN, LEVOFLOXACIN, LINEZOLID, CLOFAZIMINE, AZITHROMYCIN, CLARITHROMYCIN
- REQUEST FOR SUSCEPTIBILITIES ON NON-TUBERCULOSIS MYCOBACTERIA
- SUBMITTER (REQUESTOR) MUST COMPLETE THE [NJMC REQUEST FORM](#) AND FAX TO DCLS

[TEST CATALOG MYCOBACTERIA](#)

Advanced Diagnostic Laboratories National Jewish HealthSM

Client Services | 800.550.6227 | 303.398.1953 | njlabs.org

SHIP TO: National Jewish Health
Mycobacteriology Laboratory
1400 Jackson Street, Room K422
Denver, CO 80206

Mycobacteriology Diagnostics Requisition

1. PATIENT INFORMATION	
Patient Name (Last, First) <input type="checkbox"/> Male <input type="checkbox"/> Female DOB ____/____/____	CF Patient Registry No. _____
2. BILLING INFORMATION - INSTITUTIONAL BILLING ONLY	
National Jewish Health Advanced Diagnostic Laboratories does not bill patients directly or third-party health insurance. Visit njlabs.org or call for details.	
Account Name	Address
Clinic ID Phone	City State Zip
Address	<input type="checkbox"/> Duplicate Report Requested
City State Zip	Name
Billing Contact Fax	Phone Secure Fax
3. REPORT DELIVERY INFORMATION	
Attention	Account Name
Address	City State Zip
<input type="checkbox"/> Duplicate Report Requested	
Name	Phone Secure Fax
4. SPECIMEN/ISOLATE INFORMATION	
Submitted By Phone	Isolate Submission Medium (Required)
Specimen Source (Required)	
<input type="checkbox"/> BAL <input type="checkbox"/> CSF <input type="checkbox"/> Sputum <input type="checkbox"/> Sputum (Induced) <input type="checkbox"/> Blood <input type="checkbox"/> Urine	<input type="checkbox"/> Liquid <input type="checkbox"/> Allquot _____ mL
<input type="checkbox"/> Tissue (specify) _____	<input type="checkbox"/> 7H9 broth <input type="checkbox"/> MGIT broth <input type="checkbox"/> Bact/ALERT broth
<input type="checkbox"/> Processed specimen (specify) _____	<input type="checkbox"/> VersaTrek broth <input type="checkbox"/> Other (specify) _____
<input type="checkbox"/> Cystic Fibrosis (CF) patient/History of Pseudomonas sp? <input type="checkbox"/> Y <input type="checkbox"/> N	<input type="checkbox"/> Solid (Plates or biplates are not accepted)
<input type="checkbox"/> Environmental sample/Contact laboratory before collection.	<input type="checkbox"/> 7H10 slant <input type="checkbox"/> 7H11 slant
<input type="checkbox"/> Veterinary sample (specify animal) _____	<input type="checkbox"/> Lowenstein-Jensen slant
<input type="checkbox"/> Other (specify) _____	<input type="checkbox"/> Other (specify) _____
Swabs not recommended for recovery of AFB organisms—tissue or aspirate is desired.	
Submitter Identification of AFB _____	MTB complex previously ruled out? <input type="checkbox"/> Y <input type="checkbox"/> N
Actual Specimen Collection Date (Required) _____	Submitter Specimen # (Required) _____
Identification must be provided for isolates when AST only is ordered. If identification is not provided, identification will be performed and billed accordingly.	
5. MOLECULAR, MICROSCOPY, GROWTH DETECTION AND ISOLATE IDENTIFICATION	
<input type="checkbox"/> AFB1 Acid-fast Bacilli (AFB) Smear & Culture (clinical specimen only) NAAT on first specimen or by request for subsequent specimen. If AFB smear and NAAT are positive, MTB1 (DIRECT) and MTB4 will be performed.	<input type="checkbox"/> AFB3 Acid-fast Bacilli (AFB) Smear & Culture (NTM) (clinical specimen only)
<input type="checkbox"/> AFB2 Nucleic Acid Amplification Test (NAAT) (clinical specimen only)	<input type="checkbox"/> AFB4 Acid-fast Bacilli (AFB) Identification
	<input type="checkbox"/> AFB5 Differentiation within M. abscessus group
6. MTB COMPLEX ANTIMICROBIAL SUSCEPTIBILITY TESTING (AST) AND MTB SPECIES IDENTIFICATION	
<input type="checkbox"/> MTB1 10-Drug agar proportion method (INH, RIF, EMB, ETH, STR, CAP, KAN, AMK, CS, PAS)	<input type="checkbox"/> MTB4 Molecular multidrug-resistant (MDR) TB Screen
<input type="checkbox"/> MTB2 First-Line Drugs: isoniazid, rifampin, ethambutol & pyrazinamide. If resistant, a 10-drug agar proportion test (MTB1) will be performed.	<input type="checkbox"/> MTB5 Molecular extensively drug-resistant (XDR) TB Screen
<input type="checkbox"/> MTB3 Pyrazinamide MIC (individual test)	<input type="checkbox"/> MTB6 Single-Drug MIC (circle) (INH, RIF, EMB, ETH, STR, CAP, KAN, AMK, CS, PAS, MXF, LVX, LZD, OFX, CLF, CIP, AZM, CLR, RFB)
	<input type="checkbox"/> MTB7 MTB Complex Species Identification
7. NTM ANTIMICROBIAL SUSCEPTIBILITY TESTING (AST)	
Slowly Growing NTM	Rapidly Growing NTM
<input type="checkbox"/> NTM10 10-Drug MIC: Includes rifampin/ethambutol combo (CLF, CIP, MXF, AMK, STR, RFB, LZD, CLR, RIF, EMB)	<input type="checkbox"/> NTM4 15-Drug MIC: Includes Clofazimine/Amikacin combo (AMK, KAN, TOB, FOX, IPM, CIP, DOX, MXF, TGC, CLR, AZM, AUG, SXT, LZD, CLF, CLF/AMK)
<input type="checkbox"/> NTM9 Rifampin/Ethambutol combo (includes RIF and EMB single drug MIC)	<input type="checkbox"/> NTM5 Single-Drug MIC (circle) (AMK, KAN, TOB, FOX, IPM, CIP, DOX, MXF, TGC, CLR, AZM, AUG, SXT, LZD, CLF, AMK/CLF, GEN, CRO, FEP, CTX, MIN)
<input type="checkbox"/> NTM3 Single-Drug MIC (circle) (RIF, EMB, CIP, MXF, AMK, LZD, CLR, CLF, RFB, STR, ETH, LVX, AZM, OFX, KAN, CS)	<input type="checkbox"/> NTM6 20-Drug MIC: Includes Clofazimine/Amikacin combo (for human AND veterinary use) (AMK, KAN, TOB, FOX, IPM, CIP, DOX, MXF, TGC, CLR, AZM, AUG, SXT, LZD, CLF, CLF/AMK, GEN, CRO, FEP, CTX, MIN)
8. SPECIAL INSTRUCTIONS	
<input type="checkbox"/> Appropriate antimicrobial susceptibility testing (AST)	<input type="checkbox"/> Isolation of mycobacteria from contaminated or impure specimens
INTERNAL USE ONLY	
Received By _____ Date _____	Account# _____ MRUN _____ Accession _____

1. PATIENT INFORMATION	
Patient Name (Last, First) <input type="checkbox"/> Male <input type="checkbox"/> Female DOB ____/____/____	CF Patient Registry No. _____
2. BILLING INFORMATION - INSTITUTIONAL BILLING ONLY	
National Jewish Health Advanced Diagnostic Laboratories does not bill patients directly or third-party health insurance. Visit njlabs.org or call for details.	
Account Name	Address
Clinic ID Phone	City State Zip
Address	<input type="checkbox"/> Duplicate Report Requested
City State Zip	Name
Billing Contact Fax	Phone Secure Fax
3. REPORT DELIVERY INFORMATION	
Attention	Account Name
Address	City State Zip
<input type="checkbox"/> Duplicate Report Requested	
Name	Phone Secure Fax

6. MTB COMPLEX ANTIMICROBIAL SUSCEPTIBILITY TESTING (AST) AND MTB SPECIES IDENTIFICATION			
<input type="checkbox"/> MTB1 10-Drug agar proportion method (INH, RIF, EMB, ETH, STR, CAP, KAN, AMK, CS, PAS)	<input type="checkbox"/> MTB4 Molecular multidrug-resistant (MDR) TB Screen	<input type="checkbox"/> MTB5 Molecular extensively drug-resistant (XDR) TB Screen	<input type="checkbox"/> MTB6 Single-Drug MIC (circle) (INH, RIF, EMB, ETH, STR, CAP, KAN, AMK, CS, PAS, MXF, LVX, LZD, OFX, CLF, CIP, AZM, CLR, RFB)
<input type="checkbox"/> MTB2 First-Line Drugs: isoniazid, rifampin, ethambutol & pyrazinamide. If resistant, a 10-drug agar proportion test (MTB1) will be performed.	<input type="checkbox"/> MTB3 Pyrazinamide MIC (individual test)	<input type="checkbox"/> MTB7 MTB Complex Species Identification	
7. NTM ANTIMICROBIAL SUSCEPTIBILITY TESTING (AST)			
Slowly Growing NTM		Rapidly Growing NTM	
<input type="checkbox"/> NTM10 10-Drug MIC: includes rifampin/ethambutol combo (CLF, CIP, MXF, AMK, STR, RFB, LZD, CLR, RIF, EMB)	<input type="checkbox"/> NTM4 15-Drug MIC: includes Clofazimine/Amikacin combo (AMK, KAN, TOB, FOX, IPM, CIP, DOX, MXF, TGC, CLR, AZM, AUG, SXT, LZD, CLF, CLF/AMK)	<input type="checkbox"/> NTM5 Single-Drug MIC (circle) (AMK, KAN, TOB, FOX, IPM, CIP, DOX, MXF, TGC, CLR, AZM, AUG, SXT, LZD, CLF, AMK/CLF, GEN, CRO, FEP, CTX, MIN)	<input type="checkbox"/> NTM6 20-Drug MIC: includes Clofazimine/Amikacin combo (for human AND veterinary use) (AMK, KAN, TOB, FOX, IPM, CIP, DOX, MXF, TGC, CLR, AZM, AUG, SXT, LZD, CLF, CLF/AMK, GEN, CRO, FEP, CTX, MIN)
<input type="checkbox"/> NTM9 Rifampin/Ethambutol combo (includes RIF and EMB single drug MIC)	<input type="checkbox"/> NTM3 Single-Drug MIC (circle) (RIF, EMB, CIP, MXF, AMK, LZD, CLR, CLF, RFB, STR, ETH, LVX, AZM, OFX, KAN, CS)		

QUESTIONS



PICTURE REFERENCES

- [HTTP://MICROLABONLINE.COM/DOCTORS-PREPARATION/](http://microlabonline.com/doctors-preparation/)
- [HTTPS://WWW.BD.COM/EN-UK/PRODUCTS/DIAGNOSTICS-SYSTEMS/IDENTIFICATION-AND-SUSCEPTIBILITY-SYSTEMS/MGIT-\(MYCOBACTERIA-GROWTH-INDICATOR-TUBE\)-SYSTEM](https://www.bd.com/en-uk/products/diagnostics-systems/identification-and-susceptibility-systems/mgit-(mycobacteria-growth-indicator-tube)-system)
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